

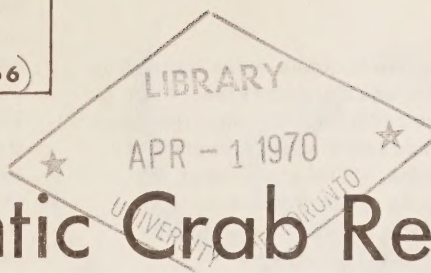
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Canadian Atlantic Crab Resources

By D.G. Wilder



RECENT developments in the fisheries for rock crabs and spider crabs in the Gulf of St. Lawrence have stimulated interest in these and other crab species. Since relatively little is known about Canadian Atlantic crabs it is timely to summarize available information, consider needs for further research, and examine possibilities for expanding the existing fisheries or developing new ones.

ROCK CRAB - *Cancer irroratus* (Fig. 1)

LIFE HISTORY

There is virtually no published information on the life history of the rock crab. Its mating, moulting, egg laying and hatching periods, its rate of growth, feeding habits and movements are largely unknown.



Fig. 1. Rock crab - *Cancer irroratus*. Nine shallow smooth-edged teeth on margin of carapace; surface of carapace and claws smooth; carapace width about $1\frac{1}{2}$ times carapace length; light-coloured background with purple or crimson spots.

DISTRIBUTION AND ABUNDANCE

The rock crab occurs from Labrador to South Carolina from the low-water mark to depths of 300 fathoms. It appears to be most abundant in the southern Gulf of St. Lawrence and in the New England States. It is present in fair numbers along the outer coast of Cape Breton Island but seems to be quite scarce in the Bay of Fundy and south western Nova Scotia. However, our impressions as to the abundance of this species depend to a large extent on catches by lobster fishermen. Since the lobster fishing seasons vary from place to place, differences in the catchability of crabs in relation to water temperature could give a very distorted picture of their abundance.

SIZE

Samples of rock crabs caught in lobster traps were measured at four ports in the northern half of Northumberland Strait. The males ranged from 3 to 5 inches in carapace width, averaging about 4 inches. The females ranged from 2 to 4 inches, most being too small for commercial use. The average live weight of both sexes as landed was 6 ounces. Rock crabs examined at two ports on the outer coast of Cape Breton Island were appreciably smaller. From the commercial point of view the rock crab is relatively small. The Dungeness crab, *Cancer magister*, of British Columbia reaches a maximum carapace width of 9 inches and a maximum weight of 4 pounds. Those above the $6\frac{1}{2}$ inch minimum legal size average about $7\frac{1}{2}$ inches and 1 $\frac{3}{4}$ pounds. Similarly, the edible crab of Europe, *Cancer pagurus*, reaches a maximum width of $8\frac{1}{4}$ inches and varies regionally in average weight from 1 to 1 $\frac{7}{8}$ pounds.

THE FISHERY

A commercial fishery for rock crabs started in Massachusetts about 1900 and gradually spread to other New England States. By 1962 the United States catch totalled nearly 2,000,000 pounds with a landed

value of \$91,000. Nearly 90% of this catch was landed in Maine.

Up to 20 years ago rock crabs were canned on a small scale at Victoria and Summerside, P. E. I. These operations did not continue for long, perhaps mainly because of the excessive labour costs for processing the small crabs. The crab meat, although tasty, was usually quite broken up and tended to darken in the can making it much less attractive than canned lobster meat.

More recently new interest in the processing of rock crabs developed in the Shediac, N. B., area. This was stimulated in part by the desire to extend canning operations which were curtailed to some extent by the 2-month lobster seasons in the Gulf of St. Lawrence. This interest led to experiments by the Industrial Development Service of the Department of Fisheries to develop a trap that would retain crabs but not lobsters and so could be fished when the lobster seasons were closed. These experiments had some success but the ease with which a crab trap could be altered at sea to catch lobsters illegally cast doubt on their use. In any case, special traps for crabs have not yet come into use on the Canadian Atlantic coast.

Since 1962 when 22,000 pounds of rock crabs were landed, the fishery has expanded rapidly. By 1965 several hundred fishermen fished crabs principally in conjunction with their lobster fishing and landed 527,000 pounds valued at \$11,800. To date, the fishery is restricted almost entirely to the northern half of Northumberland Strait where the lobster fishing season is from August 10 to October 10. In 1963 the daily crab catch per boat varied from 150 to 4,000 pounds. One boat in the Pugwash, N. S., area was reported to average 1,900 pounds a day from September 5 to October 10. The price to fishermen has averaged 2.3 cents per pound live weight. In 1964, 3,600 cases of 48 five-ounce cans were packed and interest in fresh-frozen crab meat was developing. In December 1965, a five-ounce can retailed for 65¢ to 79¢ in the Halifax, N. S. area.

MEAT YIELD

To determine the potential meat yield some of the larger crabs caught off Summerside, P. E. I., in October were boiled and the meat carefully removed from the claws, legs and body. The yield averaged 21% of the live weight. Since all parts of the crab are not used commercially and since many of the smaller crabs are undoubtedly discarded after landing, the present commercial meat yield is much lower, probably averaging about 10%.

RELATION TO THE LOBSTER FISHERY

The effect that fishing crabs has on the much more valuable lobster stocks is not known. In many

areas crabs and lobsters occupy different kinds of bottom but at times their distribution appears to overlap considerably. Under such conditions crabs and lobsters probably compete for a common food supply and probably prey on each other. Certainly lobsters are known to eat crabs and it seems likely that hard-shelled crabs would attack the smaller lobster at least when they are soft. The net effect of these relations is unknown but it seems possible that reducing the crab stocks through fishing could increase the lobster production.

POTENTIAL

It is difficult from the available information to estimate the commercial potential of this species. Present production is essentially a by-product of an intense warm-water lobster fishery in one region. Whether satisfactory trap catches can be made in other lobster districts during cold-water seasons remains to be seen. The small size of the crabs, the high labour costs of processing and the low meat yields necessitate low prices for the raw product. This in turn means that a dense stock of crabs, readily catchable at low costs, must be available to the fishermen. These conditions are now met in the northern half of Northumberland Strait but as the fishery continues stock densities, sizes of crabs and individual profits are expected to decline. Rock crabs probably could be caught commercially in some areas with otter trawls. Another possible fishing method is the trotline such as is used to catch blue crabs (*Callinectes sapidus*) in the Chesapeake Bay area. With this method a long line baited at frequent intervals is set on bottom and crabs that cling to the bait are caught as the line is raised. Results of one small-scale trial of this method in Northumberland Strait by an inexperienced operator were not too encouraging but the method should not yet be ruled out.

JONAH CRAB - *Cancer borealis* (Fig. 2)

The Jonah crab is very similar to the rock crab with which it is often confused. It occurs from Nova Scotia to South Carolina at depths to 400 fathoms. It is the dominant crab species in southern Nova Scotia and the Bay of Fundy but we have no definite knowledge of its occurrence in the southern Gulf of St. Lawrence. Jonah crabs caught off southern Nova Scotia in lobster traps from December to May are somewhat larger than trap-caught rock crabs in the Gulf of St. Lawrence but this could result in part from differences in the lobster traps. In contrast to the rock crabs, female Jonah crabs greatly outnumber the males in trap catches. The sexes do not differ appreciably in size. Winter and early spring catches from lobster traps suggest that Jonah crabs are much scarcer off southern Nova Scotia than rock crabs in the Gulf of St.

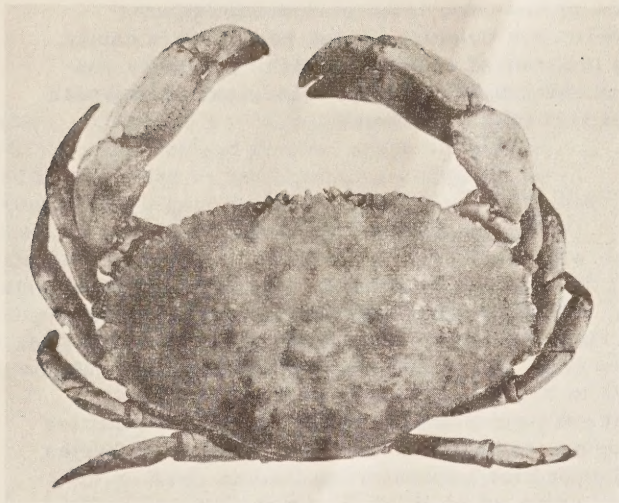


Fig. 2. Jonah crab - *Cancer borealis*. Similar to rock crab; 9 teeth on margin of carapace have rough edges; surface of carapace and claws rough; margin of carapace more rounded; carapace width about $1\frac{1}{2}$ times carapace length; usually reddish above, yellowish below.



Fig. 3. Spider crab - *Chionoecetes opilio*. Walking legs 2-3 times as long as carapace and flattened; carapace with scattered, unequal, wartlike tubercles; carapace width and carapace length about equal; light brick-red above, yellowish below. (Photo courtesy J.S. MacPhail)

Lawrence. This could, however, simply reflect the effect of water temperature on the crabs' activity and catchability. Jonah crabs were quite abundant off southern Nova Scotia during the summer of 1965 at depths of 25 to 50 fathoms and were well represented in Yarmouth County lobster fishermen's catches during December 1965.

Although the meat of the Jonah crab has a good flavour the species has had only limited commercial use. This may be because of its more restricted distribution, its lesser abundance or possibly its harder shell which makes extraction of the meat more difficult and reduces the yield.

SPIDER CRAB - *Chionoecetes opilio* (Fig. 3)

LIFE HISTORY

Knowledge of the biology of this species in the Canadian Atlantic is based almost entirely on the observations of Mr. Pierre Brunel formerly of the Marine Biological Station at Grand River, P. Q. In the Gaspé region the crabs appear to be scarce in June, possibly because they are buried in the mud during moulting and mating. The smaller male crabs and the females appear to moult earlier (May-June) than the larger males (May-mid July). The proportion of soft-shelled, slack-meated crabs declines from June to October. Newly laid eggs are orange and vary in number from 7,000 for a 2-inch

carapace length female to 80,000 for a 3-inch female. During embryonic development the individual eggs more than double in size but many are lost, a 3-inch female carrying only 20,000 ripe eggs on the average. The greyish, eyed eggs start hatching in May-June.

DISTRIBUTION AND ABUNDANCE

The spider crab occurs to depths of 350 fathoms from West Greenland to Maine and from Alaska to Siberia. Our knowledge of it in the Canadian Atlantic is limited mainly to the Gulf of St. Lawrence where it is known to occur off Anticosti Island, along the Gaspé coast and between Cape Breton Island and the Magdalen Islands. It is associated with cold water (30-40°F) and is most abundant on mud bottom. Too little information is available to describe its distribution accurately or estimate actual stock densities. It is, however, quite widely distributed in the Gulf at depths of 30-100 fathoms and abundant enough in places to yield catches of 300 pounds or more per hour with a standard #41 Yankee trawl.

SIZE

The males attain a carapace length of 6 inches, or with legs fully extended, a maximum spread of 36 inches. In the Gulf they reach a maximum weight of $2\frac{3}{4}$ pounds averaging about $1\frac{1}{2}$ pounds. The

females are much smaller, seldom exceeding a pound and are rarely used commercially.

THE FISHERY

The Canadian Atlantic commercial fishery apparently started in November 1960 when Quebec United Fishermen operating groundfish draggers in the Anticosti Island area landed 12,000 pounds of spider crabs. Since that time small quantities, not exceeding 18,000 pounds, have been landed annually in Gaspe and marketed fresh or frozen mainly in Montreal.

EXPLORATORY FISHING

Spider crabs have been caught off Gaspe during experimental fishing with beam trawls and 5- to 6-inch mesh gill nets set on bottom. To our knowledge they are not caught in lobster traps. During experimental bottom trawling two to three times as many crabs were caught at night as in the daytime.

In September and October 1965 Danish seiners were chartered in a joint project by the Industrial Development Service of the Department of Fisheries of Canada and the Nova Scotia Department of Fisheries. From 136 sets at 20 to 75 fathoms between Cape Breton Island and the Magdalen Islands over 19,000 pounds of spider crabs were landed with best catches at 50 to 75 fathoms. From December 1965 to February 1966 the Industrial Development Service explored essentially the same area with a chartered medium dragger using a standard #41 Yankee trawl.



Fig. 4. Northern stone crab - *Lithodes maia*. Numerous prominent spines on carapace and legs; 8 spines on rostrum; carapace slightly longer than wide; brownish in colour with legs obscurely banded; last pair of legs very small and folded under carapace.

In 124 $1\frac{1}{2}$ to 2-hour tows in 35 to 135 fathoms, 12,141 crabs weighing 18,195 pounds were caught. This program of exploratory fishing is being continued and expanded to cover more extensive areas in the Gulf of St. Lawrence.

MEAT YIELD

The meat, most of which is obtained from the legs, is tender, pleasantly flavoured and has been well received in marketing trials. The yield has varied from 15% of the live weight in commercial plants to 18% in small-scale laboratory trials. Studies of processing methods and storage qualities are being conducted by the Department of Fisheries, Fish Inspection Laboratory in Halifax, N. S.

POTENTIAL

Too little is known of the distribution, abundance, behaviour, reproduction, survival and growth of spider crabs or of efficient fishing methods and market demand to estimate the potential value of this species. Exploratory trawl catches and fishermen's reports have suggested dense stocks in some areas but the extent of these grounds and their annual productive capacity are not yet known. There are suggestions that spider crabs grow slowly. If so, an intensive fishery would be expected to reduce the abundance of the more desirable large crabs rather quickly. Since crabs and groundfish are often caught together, it is probable that a spider crab fishery can be developed as a worthwhile supplement to existing groundfish fisheries.



Fig. 5. Toad crab - *Hyas araneus*. Carapace subtriangular in shape, about $1\frac{1}{3}$ times as long as wide; two rostral horns touching; surface of carapace uneven with blunt tubercles; dull purplish-red above, buff below.

NORTHERN STONE CRAB -
Lithodes maia (Fig. 4)

This species reaches a carapace length of 7 inches. It resembles the spider crab, *Chionoecetes opilio*, in size and general shape but can be readily identified by the numerous spines on its carapace and legs. It occurs at depths of 35 to 300 fathoms from Newfoundland to New Jersey and in northwestern Europe. In the Gulf of St. Lawrence it appears to live in deeper, warmer water than the spider crab. There is so little information on its abundance, distribution and quality that we cannot hazard a guess as to its commercial potential.

TOAD CRAB - *Hyas aranes* (Fig. 5)

This member of the spider crab family is found from shallow water to depths of 275 fathoms from Labrador to Rhode Island, in Greenland, Iceland, northern Europe and Spitsbergen. This and closely related smaller species are unlikely to be of commercial significance but will probably be caught from time to time during exploratory and commercial fishing for spider crabs.

DEEP SEA RED CRAB
Geryon quinquedens (Fig. 6)

This dark red crab occurs at depths of 100 to 1,000 fathoms from Nova Scotia to Cuba. In exploratory fishing along the continental slope between Nova Scotia and Virginia by the Woods Hole Oceanographic Institution it was found most abundant at depths of 200 to 600 fathoms. Here the catch per hour's trawling with nets having 35- to 60-ft ground ropes averaged 48 crabs. The crabs were abundant on muddy bot-

tom but good catches were also taken on hard bottom. Bottom water temperatures ranged from 38 to 42°F. This crab reaches a carapace width of 7 inches, a leg spread of over 2 feet and a weight of more than 2½ pounds. The meat is excellent. The crab dies quickly in air or water at temperatures above 45°F but will live several days buried in ice.

SUMMARY

Of the various crab species that occur off the Canadian Atlantic coast, the spider crab (*Chionoecetes opilio*) the rock crab (*Cancer irroratus*) show most promise for increased commercial use in the near future. The spider crab is larger, of higher quality and easier to process but is probably much less abundant and less widely distributed than the rock crab. It may make significant contributions to dragger catches in the Gulf of St. Lawrence but seems unlikely to form the basis of an independent fishery. Similarly the rock crab may become a valuable supplement to lobster catches particularly if more efficient processing methods would permit higher prices to the fishermen. The small size of rock crabs, low meat yield, high processing cost, low prices and the difficulties in regulating a trap fishery for this species during closed lobster seasons tend to rule out an independent fishery. The Jonah crab (*Cancer borealis*) does not seem to be caught in lobster traps in sufficient quantities to warrant appreciable commercial use but information on seasonal and geographic variations in abundance is scarce. The red crab (*Geryon quinquedens*) shows real promise, particularly in conjunction with a deep-water trawl fishery for lobsters.

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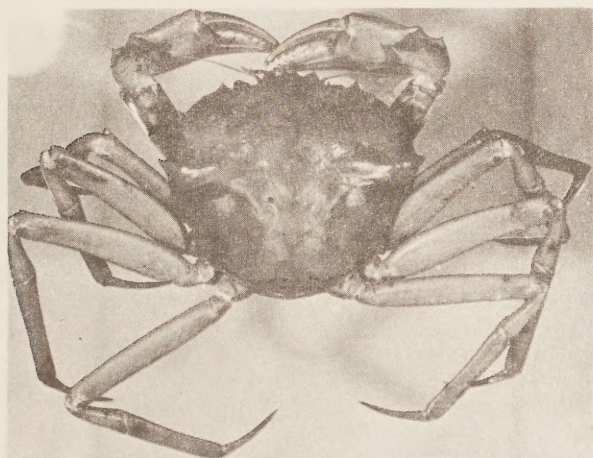


Fig. 6. Deep sea red crab - *Geryon quinquedens*. Five teeth on margin of carapace; carapace width about 1½ times carapace length; carapace smooth with a rounded transverse ridge at widest part; posterior half of carapace with nearly straight margins; dark red.

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